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PROBLEMS IN LEAD MINING APPRAISALS (PART I)

PROBABLY our most interesting and most difficult appraisal assignment to date, began when we were employed to appraise the fair market value of three lead mining operations in southeastern Missouri. After studying what books and articles could be found on the subject, we proceeded to get our feet wet. First of all it was realized that it was necessary to make a detailed analysis of the vast land holdings of the company. These land holdings could be broken down into: fee simple ownership of surface and mineral rights, mineral rights only, and surface rights only.

Since one of the purposes of this appraisal was to furnish a basis of appeal of the company's real estate tax assessment, it was necessary to locate, inventory, and price each item of value, either real or personal property, so that value could be apportioned properly to the numerous tax parcels divided among 23 school districts in which the extensive holdings were situated. At the beginning, a look at the task ahead was staggering. However, with full cooperation of the lead company and a competent guide, the inventory was begun. As the detailed inspection and listing of building contents was conducted, the construction features and dimensions of each building were noted. Physical condition as observed by the appraiser was also noted on buildings and contents. Upon completion of the detailed analysis of surface installations, the same procedure was carried out on the underground improvements and personal property. The surface hoisting and milling installations consisted of literally hundreds of buildings of various types of construction, both large and small, containing thousands of items of machinery and equipment. Also present on the surface were mile upon mile of high-voltage power lines, water lines, and slime lines, as well as hundreds of 5kva to 1500kva transformers. It should be mentioned here that the surface holdings included the water supply and distribution system for a number of towns in the surrounding area, a few farms and many town lots, both improved and unimproved.

The underground installations also included many miles of power lines, water and air lines. Also included were two major machine shops, hundreds of miles of narrow gage railroad and trolley wire, including switches and signals, vast quantities of mining, hauling and loading equipment, motor-generator sets and pumps.

Costing was accomplished as the inventory progressed. Estimating reproduction costs of the buildings posed no special problems. However, it was necessary to make many adjustments for deviation from conventional construction because of foundations and supports for very heavy machinery. The pricing of standard items of machinery was accomplished through quotations from suppliers; however, a large portion of the mining equipment was designed and built by the lead company. Pricing of this special-purpose machinery required close association between the appraiser and the mining company's accounting and purchasing departments to facilitate estimating the actual replacement cost of this equipment new today.

Upon completion of the pricing, physical depreciation, as estimated by the appraiser through consideration of age (actual or estimated) and present condition as observed on inspection, was applied.

In our summation approach to value, intangible items were considered to have no physical value. Abandoned mine shafts used for ventilating the mines, churn drill holes for the entrance of piping and wiring, underground haulage ways, mined-out stopes and other items in this category were considered to be only a means of access to the presently existing ore reserves.

We soon realized that the replacement cost of these improvements would amount to hundreds of millions of dollars and that the physical value was also sizable, but because of depletion in ore reserves we felt certain that a great amount of obsolescence had taken place.

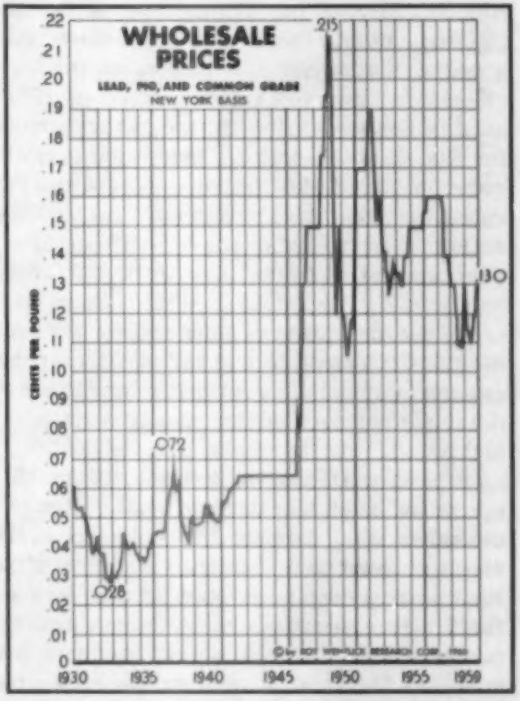
We knew that the income approach was our key to the valuation problem as we knew that the value of a mining-milling operation could not exceed the net value of known and potential ore reserves. At that point, we realized, that in order to apply an income approach to the valuation of the real property, it would be necessary also to inventory the mining machinery and equipment that was classed as personal property. This added to the difficulty of the inventory and pricing operation. While one of our appraisers was straightening out and collating the types of land and the extent of ownership, which exceeded 45,000 acres purchased over a period of nearly 100 years, and another of our appraisers was carrying on with the inventory problem, I proceeded with the study of the application of the income approach.

The accounting department of the lead company was requested to furnish operating statements for the past ten years. An analysis of these statements revealed that, in this ten-year so-called "boom" period, there were some years of feast and suddenly a period of famine. Details of the operating statements were then requested so that items of operating cost could be analyzed on the basis of some common denominator. It was decided that a fitting common denominator would be a unit cost per ton of lead concentrates produced by the mill, as the volume of concentrates produced during the ten-year period was relatively stable. It was realized that the gross and net annual income during

that period varied considerably because of the fluctuations in the price of lead. It was necessary, therefore, to make an economic study relative to lead prices and the factors affecting those prices in order that we could estimate the future annual income from the mining-milling operations, more accurately.

In making this study, we first analyzed the wholesale price of pig lead and found that that price varied from a low of 2.8¢ in 1932 to a high of 21.5¢ in the winter of 1948-49 and that the market continued to fluctuate on a declining trend to a point as low as 10.8¢ in 1958. The object was to find the reason for these tremendous fluctuations. Early investigations revealed that during the period of World War II, the Government had stabilized the price of lead at 6.5¢ per pound on a New York basis. In 1946, after decontrol, the price of lead soared immediately to 21.5¢ per pound. A charting of the wholesale price of lead is shown at the bottom of this page.

Studies were made of lead consumption and production, both primary and secondary, in the United States, as well as of imports and exports. Total United States mine production reached its peak in 1942, and since that time has fluctuated along a declining trend line. Secondary recovery statistics reveal that it has been on a long-term gradual trend upwards from 241,500 tons in 1939 to as high as 518,110 tons in 1951. Secondary recovery then declined slightly and remained on a fairly level keel. It was realized that secondary recovery was a much more important supplier during the period 1930 to 1958 than primary lead production. Nevertheless, the production of primary and secondary lead was insufficient to supply the domestic consumption. This deficit was made up by the import of lead, which in 1958 amounted to 581,674 tons. The increase in imports grew rapidly from 1940 until imports became a major means of supply in the United States and furnished a surplus that eventually glutted the domestic market. It was this supply of low-price lead to a high-price market that forced the collapse of the domestic market. Foreign lead could be imported at a price 2¢ less than domestic prices. In 1958, when imports amounted to 218 percent of domestic production, the Government established import quotas

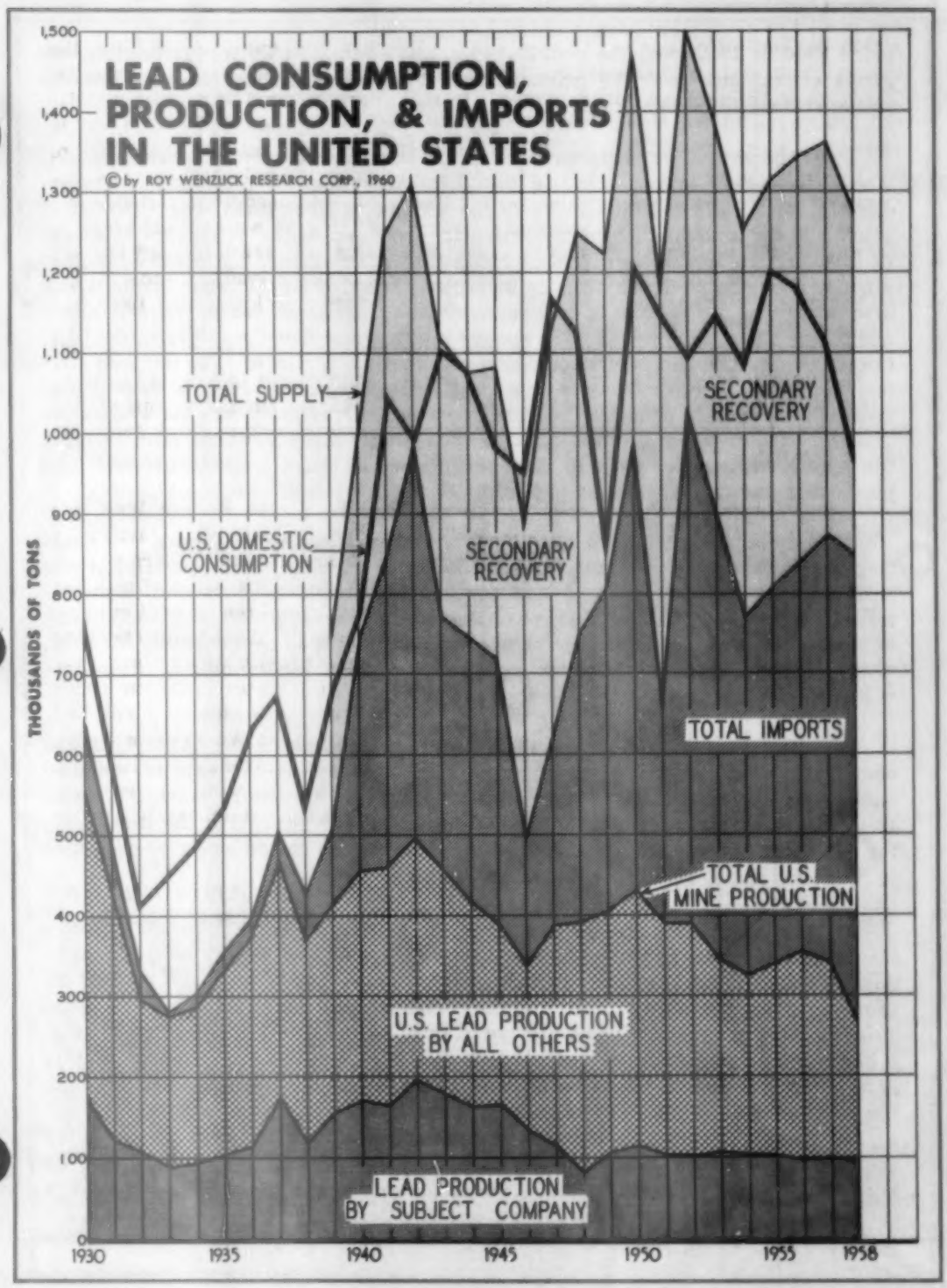


which became effective in October 1958. Roughly, the quota would allow the equivalent of 354,720 tons of lead as lead, or in ore, to be imported annually. These quotas, however, did not cover other imports of lead products and with the low price in the foreign market, which was 9¢ as compared with 13¢ in New York at the time of our study, it was realized that minor fabrication of lead could be performed without increasing the economic price of the imported lead to a point over the domestic price of pig lead. Consequently, it was believed that the barn door was only half closed and imports would continue to be a threat on the domestic market. These imports of lead are attracted by high prices, but production abroad is not tied to price because lead is a co-product with copper, zinc, gold, and silver. Labor costs are lower and ores are richer.

Since the foreign lead market was oversupplied, and at a low price, our exports had decreased to less than 2,200 tons in 1958, with little hope of any worthwhile increase. A chart showing these factors of demand and supply is shown opposite.

Price stabilization of lead was not instituted during the Korean War and, consequently, with an increase in demand the price became very favorable. For that reason we thought it would not be proper to include those years of high prices in an average that could be used to estimate the future value of production in applying the income approach. Furthermore, as of the date of our appraisal, it was found that a source of demand in the past threatened to become a source of supply. We refer to the Government's strategic stockpile. Purchases for the stockpile stopped in 1958 except for the barter program operated in cooperation with the Department of Agriculture. The amount purchased for the stockpile and its inventory is not public information. We do know, however, that in 1958 the Director of the Office of Civil and Defense Mobilization ruled that the stockpile should be based on the expectation of a 3-year war rather than one of 5 years. This change in the Government stockpile represented a threat to the market of the future.

If the demand were as strong as supply, prices would not be falling. Domestic consumption in 1957 and 1958 dropped primarily because of a buildup of excess stocks and growing competition of other metals and plastics. At this point we began studying the domestic consumption of lead by its various uses and found, for the most part, a decline during recent years in the use of lead as a paint pigment, for use in storage batteries, and as cable covering, some of the most important uses of lead. It was learned that, because of the decline in the mass use of lead, the industry formed a cooperative group to attempt to discover new uses for lead to bolster the declining demand. We also learned that some companies were going into plastics in order to continue to supply their former customers. We reached conclusions, particularly after studying quotations on the future price of lead, that it would not exceed the average secured in 1958, with a good possibility that it could drop in the future below the lower prices that were paid in 1958. We believed, however, that the average


LEAD CONSUMPTION, PRODUCTION, & IMPORTS IN THE UNITED STATES
© by ROY WENZLICK RESEARCH CORP., 1960
THOUSANDS OF TONS
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
1930
1935
1940
1945
1950
1955
1958
TOTAL SUPPLY
U.S. DOMESTIC CONSUMPTION
SECONDARY RECOVERY
SECONDARY RECOVERY
TOTAL IMPORTS
TOTAL U.S. MINE PRODUCTION
U.S. LEAD PRODUCTION BY ALL OTHERS
LEAD PRODUCTION BY SUBJECT COMPANY

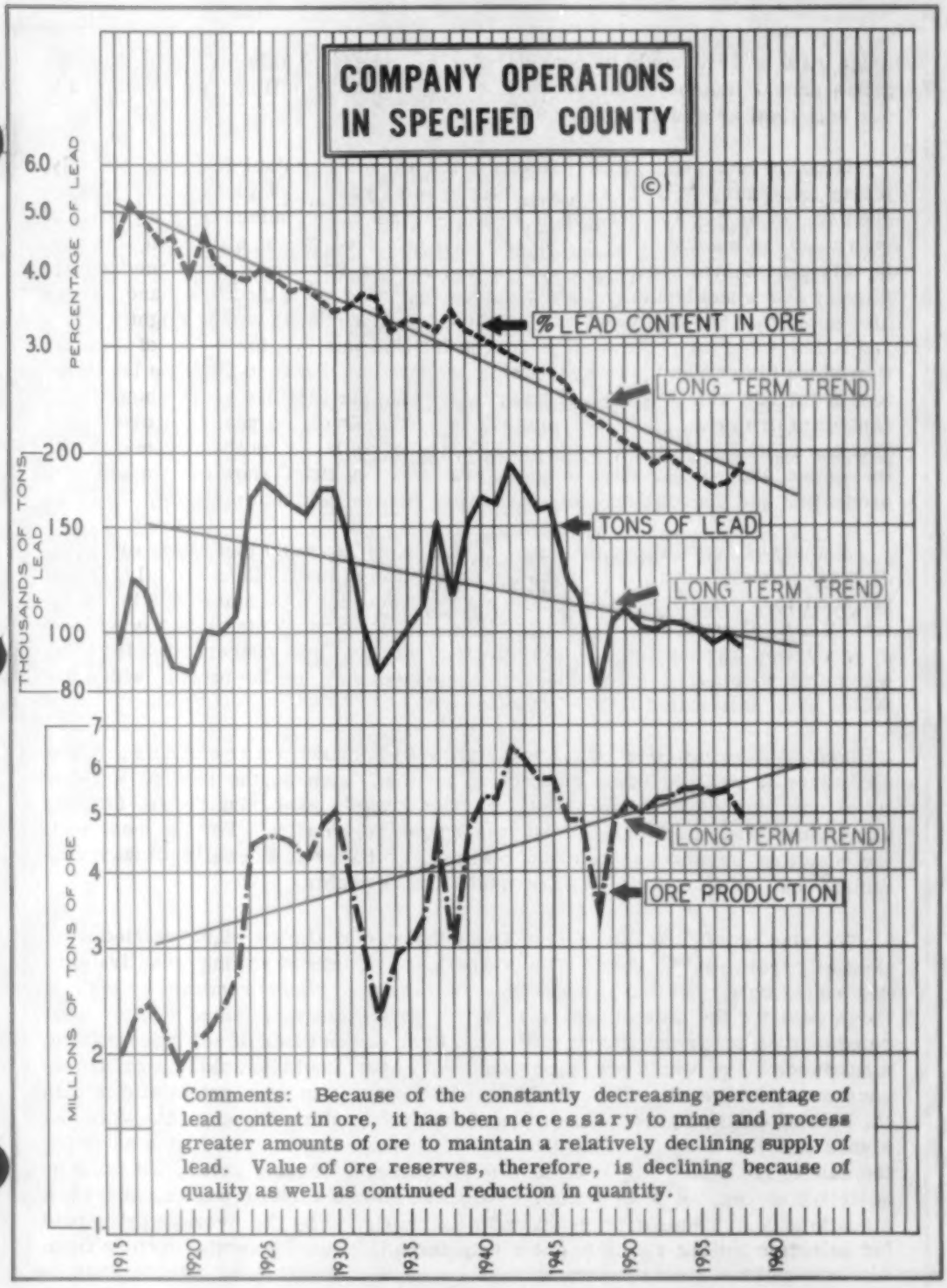
price paid in 1958 could be considered a realistic basis for estimating the gross annual income of the production of the mining-milling units included in our appraisal as of January 1, 1959.

Once the unit value of the product of the mine was established realistically, it was necessary to determine the physical volume of production. Consequently, an analysis was made of the volume of ore mined over a period of years and the amount of lead concentrates produced at the mill from this ore. In this particular instance it was noted that the volume of ore mined varied slightly above and below a slightly increasing trend. On the other hand, it was also noted that the volume of concentrates being produced varied slightly above and below a declining trend. The reason for this was that the factor of realization of lead to ore had been decreasing constantly. Prior to 1920 the lead content of the ore was in excess of 5 percent, while the past few years showed lead content of ore being processed under 2 percent. Over the years the ore bodies that were found and mined were not as rich nor as large as those mined during the prime and earlier days of the operations. A chart showing ore and lead production and the realization of lead from the ore is shown opposite.

A study of the milling and hoisting facilities revealed that more ore could be processed in order to stabilize the production of lead. Consequently, it was believed that the production of lead concentrates could be stabilized in the future at a level equal to the average of the past 5 years. This stabilized volume of production was multiplied by the average value of lead concentrates for 1958, which was considered a reasonable price expectancy for the future, which resulted in an anticipated level of income.

Before drawing conclusions as to the gross income expectancy, it was necessary to analyze other anticipated income, such as the sale of crushed limestone, agricultural limestone, sand and gravel, timbering rights, farming and pasture rights, rental of company-owned residences. For the most part, the resulting income was fair and reasonable, based on the sales of such materials and going rentals on farm and pasture rights.

We also noted that the income from the sale of timber rights varied substantially from year to year. The company had practiced selling selective cutting rights only. Although prices paid for these rights were not as high as those paid for the sale of entire timber rights, this maintained a fairly good reforestation program. It was estimated that, on the basis of selective cutting, a hardwood crop, which predominates in this area, could be sold approximately once every ten years. This would result in greater income potentialities than the sale of entire rights. The sales of these selective cutting rights were analyzed and the average price paid for them per acre was used as a basis for the sale of the timber rights on all timber acreage, whether scrub, cut-over by selective means, or in its prime. The total wooded acreage was considered in a continuous forestation program and was multiplied by the average price paid for selective cutting rights to get a long-term (10-year) potential income from


COMPANY OPERATIONS
IN SPECIFIED COUNTY
©
PERCENTAGE OF LEAD
6.0
5.0
4.0
3.0
% LEAD CONTENT IN ORE
LONG TERM TREND
THOUSANDS OF TONS OF LEAD
200
150
100
80
TONS OF LEAD
LONG TERM TREND
MILLIONS OF TONS OF ORE
7
6
5
4
3
2
1
LONG TERM TREND
ORE PRODUCTION
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
Comments: Because of the constantly decreasing percentage of lead content in ore, it has been necessary to mine and process greater amounts of ore to maintain a relatively declining supply of lead. Value of ore reserves, therefore, is declining because of quality as well as continued reduction in quantity.

this program. However, since it was estimated that only one crop could be expected in a 10-year period, this gross timber expectancy for a 10-year period was divided by 10 to come up with an anticipated average annual yield from the sale of selective cutting rights.

Current rentals on field and pasture land were also analyzed to give an anticipated net that could be expected from the use of such suitable land not contained in the general mill or shaft areas. As a general rule, mining companies prefer not to sell surface rights over their mineralized areas because of the damages that have to be paid later in the event that additional surface facilities are required or when exploratory drilling is necessary or when churn drill holes are needed for the installation of power lines, ventilation shafts, etc.

The surface land rights owned by the company where the subsurface rights were considered blank minerally were appraised strictly by the use of comparable sales and were not considered in the income approach.

It is realized that it is very unlikely that another appraisal will ever be made that will have the same characteristics and problems encountered. However, many of the individual problems do arise, particularly in the appraisal of natural resources, and it is believed that the thoughts, ideas, and approaches would be applicable and of interest to our readers.

More of these problems will be discussed and analyzed in the next issue of the Appraisal Bulletin.

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